

Default

- Default = the use of any constant, equation, model, process, strategy, or evaluation as identified within the RISC Technical Guide
 - area screening
 - plume stability evaluation
 - closure sampling
 - closure level
 - other standard procedures or inputs

Nondefault

- Nondefault = anything not prescribed for general application in RISC
- Nondefault = any pertinent procedure with a valid technical or policy basis
- Benefits
 - accuracy
 - expense
 - necessity & flexibility

Nondefault (cont)

- Relatively simple or complex
- Combine default and nondefault
 - eliminate migration to ground water
 - substitute a smaller DAF in the partitioning model when subsurface source > 1/2 ac
 - use soil samples from screening or characterization for a closure demonstration

Nondefault (cont)



- **Concerns**
 - greater technical expertise (expense)
 - toxicologist (eg. Dermal absorption)
 - hydrogeologist (eg. Ground water modeling)
 - more site work (expense)
 - hydraulic conductivity testing for modeling

Site specific data

- Soil to ground water partitioning model
- Soil saturation limit (C_{sat})
- Soil attenuation capacity (SAC)

Soil-to-Ground Water Partitioning Model Migration to ground water US EPA Soil Screening Guidance TBD Assumes: infinite 1/2 acre source extends to water table no NAPLs unconsolidated homogeneous aquifer more info pg 34 SSG-TBD

$$CL = C_w \times DAF \times \left[K_d + \frac{q_w + q_a H'}{r_b} \right]$$

$$CL = \text{Closure level}$$

$$C_w = \text{Closure level for ground water (constituent specific in milligrams per liter)}$$

$$DAF = \text{Dilution attenuation factor (default value is equal to 20 for ½ acre, and 30 for 1/4 acre, or a site-specific DF may be substituted}$$

$$DF = \text{Dilution factor}$$

$$CL = C_{W} \times DAF \times \left[K_{d} + \frac{q_{W} + q_{a}H'}{r_{b}} \right]$$

$$K_{d} = \text{Soil-water partition coefficient}$$

$$For organic compounds, K_{d} \text{ is equal to } K_{oc} \times f_{oc} \text{ where:}$$

$$K_{oc} = \text{Soil organic carbon-water partition coefficient (constituent specific in liters per kilogram)}$$

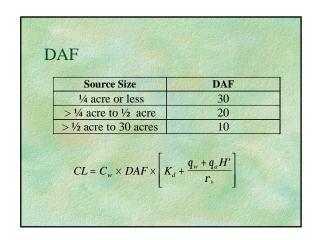
$$f_{oc} = \text{Organic carbon fraction of soil (default at 0.002 g/g)}$$

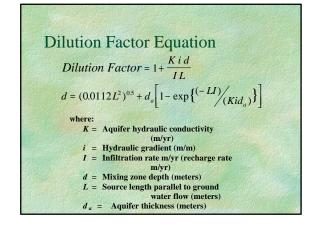
$$2_{w} = \text{Water-filled soil porosity (default at 0.3 L water/L soil)}$$

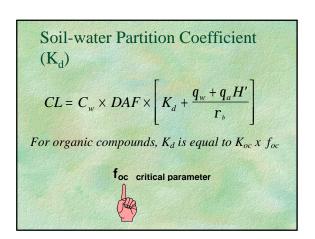
$$2_{a} = \text{Air-filled soil porosity (default at 0.13 L air/L soil)}$$

$$H' = \text{Henry's Law Constant (dimensionless)}$$

$$D_{b} = \text{Dry soil bulk density (default at 1.5 kg/L)}$$







K_d and inorganics

- Dependent on pH, redox, cation exchange capacity, iron oxide, foc, and chemical form
- measure soil pH for metals and ionizing organics (between 6 and 8 - default ok)
- egeneric pH specific Kd (Table C-4 SSG-User's Guide)
- [™] Beryllium and Mercury site specific K_d

Significano	ificance of pH on Nickel pH		
• <u>pH</u>	K _d Cl	osure level (ppm)	
4.9	16	32	
6.8	65	130	
8	1900	3800	

Significance of pH on Mercury

pH K_d Closure level (ppm) 4.9 0.04 0.002 52 2.1 6.8 8.0 200 8.1

Lead

Default closure level is considered protective for migration to GW anywhere

Recommend site specific evaluation using Synthetic Precipitation Leaching Procedure (SPLP, SW846 Method 1312)

Soil Saturation Limit

$$C_{sat} = \frac{S}{r_b} \left(K_d r_b + q_w + H' q_a \right)$$

Adsorptive limits soil particles Solubility limits of soil pore water Saturation of soil pore air

Foc most sensitive criteria

SAC

- Default 6000 mg/kg surface soil
- ² Default 2000 mg/kg subsurface soil
- Site specific SAC = $f_{oc} \times 10^6$

eg. $f_{oc} = 0.7\%$ SAC = 0.007 g/g x 10 6

SAC = 7000 mg/kg

Determining Site-Specific Foc

- Sample beyond contaminated areas
- Composite from at least 2 borings
- More than 1 soil type use weighted ave.
- Purpose dictates approach

$$\overline{c} = \frac{\sum_{i=1}^{n} l_i c}{\sum_{i=1}^{n} l_i}$$

cave = Weighted avg soil conc.

c_i = Rep soil conc in an interval

= Soil interval length

n = Interval number

Nondefault Plume Stability

- Variations to the default:
 - using existing but incomplete ground water data (eg, some quarterly data missing for M-K trend test)
 - additional monitoring and evaluation if low % of sample results show a trend

Fate and Transport Modeling

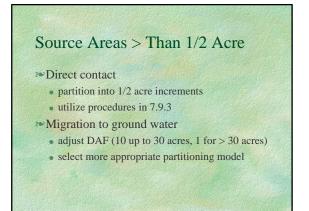
- Select appropriate model and input parameters
- *Key criteria:
 - site conditions appropriate to model limitations
 - data sufficient, documentation adequate
 - proper calibration (sensitivity/error anal.)
 - future conditions assumptions are correct

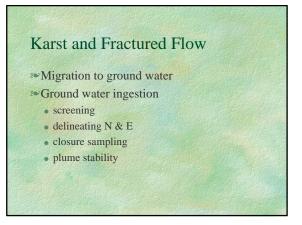
Other Pathways, Exposures, and Media (Table 7-3)

- Soil
 - vapor intrusion
- Ground Water
 - industrial process water
- ≥ Air
 - particulate and vapors in ambient air
- Surface Water
 - recreational

Other Pathways, Exposures, and Media

- Pathway Elimination
 - Direct contact pathways with presence of "permanent" physical barrier (ie asphalt)
 - Recreational pathways in surface water (if swimming prohibited or unrealistic)
 - Ingestion pathway for ground water
- Criteria: protectiveness of remedy, and effectiveness of institutional controls





Nondefault Sampling Criteria Table 7-4 **Very general criteria **Procedure for large complex sites (multiple source areas)

